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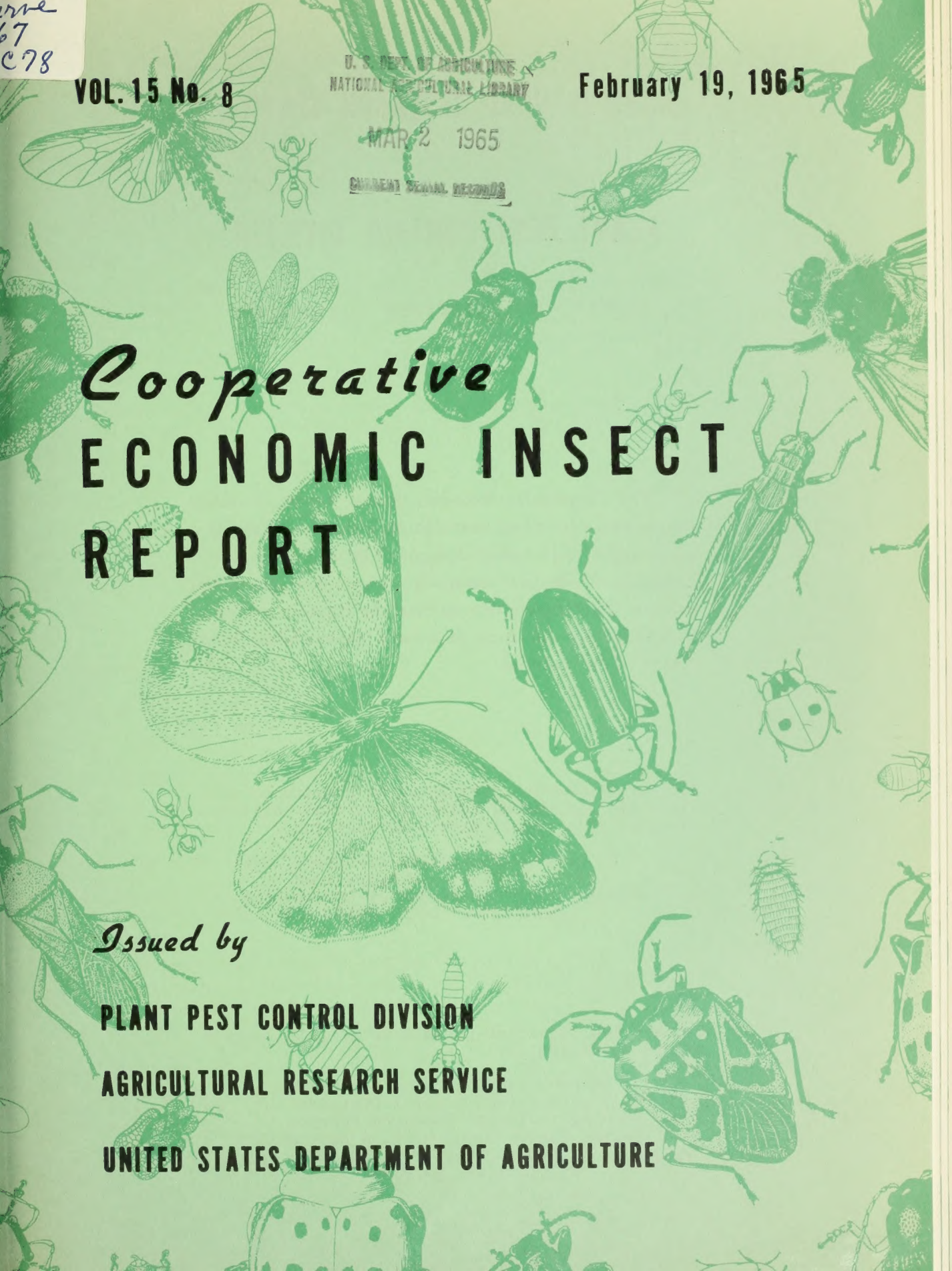
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CURRENT SERIAL RECORDS



Cooperative ECONOMIC INSECT REPORT

Issued by

PLANT PEST CONTROL DIVISION

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearinghouse and does not assume responsibility for accuracy of the material.

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COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

SPOTTED ALFALFA APHID populations decreasing in alfalfa but PEA APHID populations increasing rapidly on same crop in Maricopa, Pinal and Yuma Counties, Arizona. Larvae of a WEEVIL (Hypera brunneipennis) increasing in numbers on alfalfa in Yuma County, with highest populations on Yuma Mesa; some controls necessary. ALFALFA WEEVIL larvae infesting alfalfa in northern Georgia, with 25 percent of plants showing feeding damage. (p. 103).

GLOVER SCALE, YELLOW SCALE and a SNOW SCALE (Unaspis citri) at highest population levels in 15 years of record on Florida citrus. (p. 104).

DETECTION

New State records reported included GRAPE ROOT BORER (Vitacea polistiformis) from Alabama (p. 104) and an ANT (Myrmecina americana) from California. (p. 108). New county records were RUSTY PLUM APHID (Hysteroneura setariae) from Tulare County and CITRUS BUD MITE (Aceria sheldoni) from San Mateo County, both in California. (p. 104).

CORRECTIONS

See page 108.

SPECIAL REPORTS

Small Grain Pest Survey in Texas. (p. 103). No significant aphid damage to small grains was observed.

Status of the Screw-worm in the Southwest. (p. 106).

Estimated Losses and Production Costs Attributed to Insects and Related Arthropods Attacking Barley, Oats, Wheat, Sugar Beets, Beans and Potatoes in Wyoming in 1964. (pp. 110-112).

Summary of Insect Conditions in the United States - 1964

Introduction (p. 113).

Weather of the Year 1964 (p. 113).

Cereal and Forage Insects

Grasshoppers (p. 116).

WEATHER BUREAU'S 30-DAY OUTLOOK

MID-FEBRUARY TO MID-MARCH 1965

The Weather Bureau's 30-day outlook for mid-February to mid-March calls for temperatures to average below seasonal normals over the western two thirds of the Nation with greatest departures in the central and southern Rockies. Above normal averages should be confined to the eastern quarter of the Country while near normal averages are expected in unspecified areas. Precipitation is expected to exceed normal over most of the area from the Continental Divide to the Appalachians except for near normal amounts in the northern Plains. In the West, precipitation should vary from subnormal in the Pacific coast region to above normal over the central and southern Plateau region, with near normal totals in the intermediate area. East of the Appalachians, near normal amounts are anticipated, except for below normal totals in Florida.

Weather forecast given here is based on the official 30-day "Resume and Outlook" published twice a month by the Weather Bureau. You can subscribe through the Superintendent of Documents, Washington, D.C. 20250. Price \$5.00 a year.

WEATHER OF THE WEEK ENDING FEBRUARY 15

The weather was unseasonably cold west of the Mississippi River and mild in the East, just the reverse of the previous week's temperature pattern. Precipitation occurring on several days was widespread.

TEMPERATURE: East of the Mississippi, maximum temperatures rose into the 70's as far north as the Ohio Valley about midweek, but fell below normal during the weekend. Nevertheless, weekly averages in the Ohio Valley and central Atlantic coastal areas were 6° to 12° higher than normal, ending a four-week spell with temperatures near normal or below. Below normal temperatures were rather persistent in most of the Far West ending a five-week spell of above normal conditions. From the central Great Plains through the lower Rockies weekly averages were 10° or more below normal. Below freezing maxima were recorded in the Salt River Valley of Arizona from the 10th through 14th.

PRECIPITATION: Precipitation ranged up to 6 inches in the lower Mississippi Valley and exceeded 2 inches in the lower Ohio Valley and a large area extending from northeast Texas to the Atlantic coast. In northern areas east of the Great Plains and in the Rocky Mountains south of Montana weekly totals were less than one inch. Elsewhere, amounts were generally lighter. During a midweek storm, snow fell north and west of a line extending from the Ohio Valley to central Texas with rain to the south. The heaviest snow fall, 6-15 inches, occurred in a belt extending from north central Kansas through northern Wisconsin. Lincoln, Nebraska, reported 20 inches. Several thunderstorms extended from northeast Texas through Tennessee.

SNOW: Snow depths increased in the Cascades and most of the Rocky Mountains. East of the Rockies, snow cover is limited to the northern Great Plains and upper Mississippi Valley, the northern Great Lakes region, northern New England and most of Maryland and Virginia where snow fell at the end of the period. (Summary supplied by U.S. Weather Bureau).

CEREAL AND FORAGE INSECTS

Small Grain Pest Survey in Texas - During the period January 29 - February 4, a small grain pest survey was made in Swisher, Hale, Floyd, Crosby, Dickens, Kent, Jones, Taylor, Callahan, Eastland, Palo Pinto, Parker, Tarrant, Ellis, Hunt, Collin, Denton, Wise, Wichita, Wilbarger, Hardeman, Childress and Hall Counties. APPLE GRAIN APHID (*Rhopalosiphum fitchii*) and an unspecified aphid, or a combination of the two species, were found in Floyd, Jones, Taylor, Palo Pinto, Parker, Wilbarger, Hardeman and Childress Counties. Populations were heaviest in Jones, Taylor, Wilbarger and Hardeman Counties, where counts ranged 100-2,000 per foot of planted row. GREENBUG (*Schizaphis graminum*) was found in Swisher, Hale, Floyd, Crosby, Dickens, Kent, Jones, Taylor, Wilbarger and Hardeman Counties. In most of these counties, *S. graminum* populations ranged from less than 1 to 10 per foot of row; however, in Hale, Floyd and Wilbarger Counties, counts ranged 10-60 per foot of row. Very small numbers of ENGLISH GRAIN APHID (*Macrosiphum avenae*) were noted in Palo Pinto County. In no case was there significant aphid damage to small grain. (Daniels).

GREENBUG (*Schizaphis graminum*) - OKLAHOMA - Light, 2-15 per linear foot, in Tillman, Jackson, Greer, Kiowa, and Payne Counties. (Okla. Coop. Sur.). ARKANSAS - Numbers remain low in northwest section. (Ark. Ins. Sur.). GEORGIA - Infestations on small grain continue light in northern section. (Johnson).

APPLE GRAIN APHID (*Rhopalosiphum fitchii*) - OKLAHOMA - Averaged 10 per linear foot in wheat field in Jackson County. (Okla. Coop. Sur.).

CORN LEAF APHID (*Rhopalosiphum maidis*) - OKLAHOMA - Ranged 4-6 per linear foot in wheat in Greer and Tillman Counties. (Okla. Coop. Sur.). NEW MEXICO - Mostly light in small grains checked in Lea County. (N.M. Coop. Rpt.).

ENGLISH GRAIN APHID (*Macrosiphum avenae*) - OKLAHOMA - Counts in wheat ranged 2-4 per linear foot in Jackson and Tillman Counties. (Okla. Coop. Sur.).

COCCIDS - FLORIDA - Antonina graminis (Rhodes-grass scale) and Aspidiella sacchari (an armored scale) severe on stems of St. Augustine grass in residential area at Hialeah, Dade County. (Stegmaier, Jan. 23, Feb. 2).

SPOTTED ALFALFA APHID (*Therioaphis maculata*) - ARIZONA - Populations decreasing in alfalfa in Maricopa, Pinal and Yuma Counties; ranged 150-200 per 100 sweeps. (Ariz. Coop. Sur.). OKLAHOMA - Averaged 20 per square foot in overwintering alfalfa in Harmon County. (Okla. Coop. Sur.). ARKANSAS - Surveys continue negative in Washington County. (Ark. Ins. Sur.).

PEA APHID (*Acyrtosiphon pisum*) - ARIZONA - Populations increasing rapidly in alfalfa in Yuma, Maricopa and Pinal Counties; range 250-2,500 per 100 sweeps. (Ariz. Coop. Sur.). NEW MEXICO - Recent rain and cold weather appear to have reduced populations considerably in Dona Ana County alfalfa. Infestations light to moderate in Lea County alfalfa. (N.M. Coop. Rpt.).

ALFALFA WEEVIL (*Hypera postica*) - GEORGIA - Larvae infesting alfalfa in northern section; 25 percent of plants show feeding damage. (Johnson).

A WEEVIL (*Hypera brunneipennis*) - ARIZONA - Larvae continue to increase in Yuma County alfalfa. Highest populations found on Yuma Mesa. Some controls necessary. (Ariz. Coop. Sur.).

CUTWORMS - OKLAHOMA - Reported heavy in alfalfa in Cotton County. (Okla. Coop. Sur.).

FRUIT INSECTS

GRAPE ROOT BORER (Vitacea polistiformis) - ALABAMA - Severe, isolated infestations on grapes at Kinston, Coffee County, and in Lee County. This is a new State record. (Thompson, et al.).

PINK SCAVENGER CATERPILLAR (Sathrobrotia rileyi) - CALIFORNIA - Larvae medium on papaya fruit in Montecito, Santa Barbara County. (Cal. Coop. Rpt.).

RUSTY PLUM APHID (Hysteroneura setariae) - CALIFORNIA - Collected from apricot (Prunus armeniaca) at residence in Porterville, Tulare County, on August 26, 1964. This is the first record for Tulare County and the first record north of the Tehachapi Mountains. Location is 160 miles north of the nearest previously reported find at Ontario, San Bernardino County. (Bur. Ent., Cal. Dept. Agr.).

APHIDS - TEXAS - Unspecified species light, locally, on terminal growth of orange trees near Lasara, Willacy County. (Texas Coop. Rpt., St. Cloud).

WHITE PEACH SCALE (Pseudaulacaspis pentagona) - FLORIDA - Moderately damaging 50 percent of 100 peach trees at Yalaha, Lake County. (Henderson, Feb. 2).

RED DATE SCALE (Phoenicococcus marlatti) - CALIFORNIA - This species and Diaspis cocois (an armored scale) medium on date palm in Montecito, Santa Barbara County. (Cal. Coop. Rpt.).

CITRUS BUD MITE (Aceria sheldoni) - CALIFORNIA - Medium on lemon tree in Burlingame, San Mateo County. This is rather unusual occurrence as species is normally confined to coastal areas in southern portion of State. Nearest known infestation is in Santa Barbara County, 250 miles south of Burlingame. San Mateo County is a new county record. (Cal. Coop. Rpt.).

Citrus Insect Situation in Florida - End of January - CITRUS RUST MITE (Phyllocoptura oleivora) infested 61 percent of groves (norm 66 percent); 39 percent economic (norm 41 percent). Although further decrease expected, some heavy infestations will occur in all districts. Highest districts south and east. TEXAS CITRUS MITE (Eutetranychus banksi) infested 34 percent of groves (norm 21 percent); 14 percent economic (norm 8 percent). Decrease expected to keep population in low range normal for time of year. Highest districts central and north. CITRUS RED MITE (Panonychus citri) infested 33 percent of groves (norm 56 percent); 4 percent economic (norm 28 percent). Population expected to remain much below average and in low range. Highest districts west and north. SIX-SPOTTED MITE (Eotetranychus sexmaculatus) infested 6 percent of groves (norm 7 percent); none economic and not expected to become important in February. GLOVER SCALE (Lepidosaphes gloverii) infested 84 percent of groves; 28 percent economic. Population in high range and at highest level in 15 years of record. Slight increase expected; highest districts south, central and east. PURPLE SCALE (L. beckii) infested 80 percent of groves; 15 percent economic. Population below normal; slight increase expected. Highest districts south and east. CHAFF SCALE (Parlatoria pergandii) infested 68 percent of groves; 27 percent economic. Population above average; increase expected. Highest districts east and south. BLACK SCALE (Saissetia oleae) infested 38 percent of groves; 15 percent economic. Population above normal low level for January; decrease expected. Highest districts east and south. YELLOW SCALE (Aonidiella citrina) infested 61 percent of groves; 17 percent economic. In moderate range but at highest level in 15 years of record. Yellow scale is present in all districts; highest in central and south. Unaspis citri at highest population level of 15 years of record. Although distribution is localized, infestations are heavier and in groves. WHITEFLIES infested 78 percent of groves; 15 percent economic. Populations will continue above normal and in moderate range. Highest districts south and east. MEALYBUGS infested 15 percent of groves; 3 percent economic. Although populations above average, it is in low range and not expected to become important in February. (W. A. Simanton (Citrus Expt. Sta., Lake Alfred)).

TRUCK CROP INSECTS

CABBAGE LOOPER (*Trichoplusia ni*) - ARIZONA - Very small larvae appearing on lettuce in Yuma Valley and Dome Valley areas of Yuma County. (Ariz. Coop. Sur.).
FLORIDA - Infesting 5 percent of 200 cabbage plants, 10 inches high, with light damage, in planting at Sanford, Seminole County. (Desin).

BET ARMYWORM (*Spodoptera exigua*) - ARIZONA - Few scattered infestations persist in cabbage and lettuce in Maricopa and Yuma Counties. (Ariz. Coop. Sur.).

GREEN PEACH APHID (*Myzus persicae*) - TEXAS - Moderate locally on spinach in Zavala County (Frers) and heavy locally on spinach in Fort Bend and Brazoria Counties (Teetes). ARIZONA - Light to medium in lettuce fields in Yuma and Maricopa Counties. Small number of medium infestations occurring on seed sugar beets in Maricopa County. (Ariz. Coop. Sur.).

THRIPS - NEW MEXICO - Generally light on onions in northern Dona Ana County; ranged 1-3 per plant. (N.M. Coop. Rpt.).

COTTON INSECTS

A COSMOPTERYCID MOTH (*Sathrobrotia* sp.) - FLORIDA - Total of 20 larvae collected from 120 blooms of wild cotton (*Gossypium hirsutum*) inspected near Tavernier, Key Largo, Monroe County. (Creamer, Feb. 5).

AN OLETHREUTID MOTH (*Crociosema plebeiana*) - FLORIDA - Single larva found in 1 of 200 bolls of wild cotton inspected in Monroe County. (Creamer, Feb. 3).

FOREST, ORNAMENTAL AND SHADE TREE INSECTS

YELLOW-STRIPED ARMYWORM (*Prodenia ornithogalli*) - ARIZONA - Heavy on petunias in Yuma, Yuma County. (Ariz. Coop. Sur.).

APHIDS - CALIFORNIA - Adults of *Cerataphis orchidearum* heavy on cypripedium plants in nursery in South San Francisco, San Mateo County. *Thoracaphis umbellulariae* heavy locally on bay trees in Montecito, Santa Barbara County. (Cal. Coop. Rpt.).

COCCIDS - MARYLAND - *Eriococcus azaleae* (azalea bark scale) infested azalea at College Park, Prince Georges County. (U. Md., Ent. Dept.). FLORIDA - *Phenacaspis cockerelli* (an armored scale) adults localized on leaves of silverthorn *elaagnus* in nursery at Fairvilla, Orange County. (Kipp, Jan 25). *Pseudococcus adonidum* (long-tailed mealybug) taken on stem and leaves of *Dichorisandra* sp. at Pierson, Volusia County, (Roberts, Kipp, Feb. 4). *Chrysomphalus dictyospermi* (dictyospermum scale) light on leaves of Veitch screw pine at Apopka, Orange County, (Mugrove, Feb. 3). These are new host records for the Florida Division of Plant Industry. (Fla. Coop. Sur.). *Diaspis caruei* (juniper scale) caused severe browning of 3 Irish junipers in nursery in Miami, Dade County. (Herrmann, Feb. 5). *Pseudococcus adonidum* moderate to severe on 84 pothos plants in gardens at Rockledge, Brevard County. (Levan, Feb. 2). *Pseudaulacaspis pentagona* (white peach scale) severe on goldenrain trees in nursery at Longwood, Seminole County, (McLeod, Feb. 2); light on same host in nursery at De Land, Volusia County (Roberts, Kipp, Feb. 3). CALIFORNIA - *Coccus hesperidum* (brown soft scale) locally heavy on oaks in Barstow, San Bernardino County. *Pseudococcus obscurus* (a mealybug) heavy locally on gardenia in Visalia, Tulare County. (Cal. Coop. Rpt.).

EASTERN LUBBER GRASSHOPPER (*Romalea microptera*) - FLORIDA - Nymphs attacking leaves of *Crinum* sp. at West Palm Beach, Palm Beach County. (Long, Jan. 27).

EASTERN SUBTERRANEAN TERMITE (Reticulitermes flavipes) - ALABAMA - Heavy populations destroying winter-damaged trees in northeastern areas. (Barwood).

NATIVE HOLLY LEAF MINER (Phytomyza ilicicola) - MARYLAND - Heavy on American holly at 2 locations in Prince Georges County. (U. Md., Ent. Dept.).

SPIDER MITES - ARIZONA - Tetranychus telarius (two-spotted spider mite) heavy on roses in Yuma County. Controls necessary. (Ariz. Coop. Sur.). FLORIDA - Eotetranychus thujae light on 1,000 Chinese junipers in nursery at Glen St. Mary, Baker County. (Collins, Jan. 14.).

INSECTS AFFECTING MAN AND ANIMALS

STATUS OF THE SCREW-WORM (Cochliomyia hominivorax) IN THE SOUTHWEST

No screw-worm cases were reported during the period February 7-13 in Southwestern Eradication Area nor since the case of January 29 in Live Oak County, Texas. This is the longest fly-free period of time in the United States this year. The Republic of Mexico reported 16 cases: Chihuahua, Tamaulipas and Veracruz reported 2 cases each and Sonora reported 10 cases. Nearly all sterile flies released were dispersed in Mexico along grid patterns and in "hot spots" except for river drops along the Frio, Atascosa and Nueces Rivers in Texas and the Rio Grande and the Rio Conchos in Chihuahua. Total sterile flies released: 58,040,400 in Mexico and 4,626,250 in Texas.

Year	Positive Cases		Negative Cases		Ratio of Positive Cases to 100 Cases Negative	
	Current	Cumulative	Current	Cumulative	Current	Cumulative
Table 1. Comparison of specimens reported during corresponding weeks in 1963 and 1964 in Southwestern Eradication Area.						
1963	2	130	18	120	11.11	108.33
1964	0	0	37	195	0.00	0.00
1965	0	4	28	348	0.00	1.14
Table 2. Comparison of specimens reported during corresponding weeks and in a corresponding area in 1964 in the United States-Mexico Barrier Zone.*						
1964	13	101	16	66	81.25	153.03
1965	14	337	16	213	87.50	158.21
Table 2A. Mexican portion of Barrier Zone only.						
1964	13	98	4	22	325.00	445.45
1965	14	335	8	130	175.00	257.69

* Barrier Zone - Area in which screw-worm eradication operations are being carried out in an effort to prevent establishment of self-sustaining screw-worm population in the United States. (Anim. Dis. Erad. Div.).

COMMON CATTLE GRUB (Hypoderma lineatum) - OKLAHOMA - Moderate on cattle in Cotton County. (Okla. Coop. Sur.). ALABAMA - Light in beef cattle herd in Lee County. (Ensminger).

MOSQUITOES - FLORIDA - Increasing and annoying in Gainesville area, Alachua County. (Mead). Aedes canadensis and Culex salinarius among species involved. (Fla. Coop. Sur.). ALABAMA - Unspecified species active and annoying in central areas. (Barwood, et al.). OKLAHOMA - Anopheles punctipennis adult found in building in Stillwater, Payne County. (Okla. Coop. Sur.).

CATTLE LICE - OKLAHOMA - Several species moderate to heavy on cattle in Cotton and Garfield Counties. (Okla. Coop. Sur.). NORTH CAROLINA - Common on cattle examined in northwest mountain counties, Jan. 24-30. Less common in Davie, Iredell and Catawba Counties in Piedmont area, Feb. 1-6. Lice found on approximately 80 percent of farms suspected of being infested in northwest mountain counties and 50 percent of farms in 3 Piedmont counties named. No severe infestations noted in either area. Bovicola bovis (cattle biting louse) heavy on young beef animal in Wake County; none found on 3 other farms in county. (Mount).

NORTHERN FOWL MITE (Ornithonyssus sylviarum) - ARKANSAS - Infestations increased in northwest section. (Ark. Ins. Sur.).

HOUSEHOLD AND STRUCTURAL INSECTS

A POWDER-POST BEETLE (Trogoxylon prostomoides) - CALIFORNIA - Adults heavy locally in bamboo wood in Alameda, Alameda County. (Cal. Coop. Rpt.).

A CERAMBYCID BEETLE (Cyrtophorus verrucosus) - NORTH CAROLINA - Found in basement of home in Davidson County. Det. by D. A. Mount. (Bernhardt).

RED CARPENTER ANT (Camponotus ferrugineus) - ALABAMA - Reproductive forms emerged from house in Coffee County. (Casaday, Ledbetter).

A MOTH FLY (Telmatoscopus albipunctatus) - MARYLAND - Large numbers of adults active in home at Wheaton, Montgomery County. (U. Md., Ent. Dept.).

CLUSTER FLY (Pollenia rudis) - MARYLAND - Troublesome in home at University Park, Prince Georges County. (U. Md., Ent. Dept.).

ELM LEAF BEETLE (Galerucella xanthomelaena) - MARYLAND - Nuisance in home at Sykesville, Carroll County. (U. Md., Ent. Dept.).

BOXELDER BUG (Leptocoris trivittatus) - NORTH CAROLINA - A nuisance around home in Person County. (Reams).

A CONIFER APHID (Cinara tujaefilina) - TEXAS - Entered homes locally in Eastland County. (Cooper).

CLOVER MITE (Bryobia praetiosa) - MARYLAND - Annoying homeowner at Sandy Point, Calvert County. (U. Md., Ent. Dept.).

STORED-PRODUCT INSECTS

Stored-Product Insects in Florida - Oryzaephilus surinamensis (saw-toothed grain beetle) and Stegobium paniceum (drugstore beetle) adults taken with stored peanuts at Ocala, Marion County. (Roberson, Feb. 1). Alphitobius diaperinus (lesser mealworm) adults taken in feed in Pensacola, Escambia County; adults and larvae taken in feed at De Funiak Springs, Walton County. (Boyd, Jan. 26, 27). Tribolium castaneum (red flour beetle) adults taken in feed at Milton, Santa Rosa County; Pensacola and De Funiak Springs (Boyd, Jan. 26, 27); and in stored peanuts at Ocala (Robertson, Feb. 1).

SAW-TOOTHED GRAIN BEETLE (Oryzaephilus surinamensis) - NEW MEXICO - Probably this species moderately heavy in chocolate candies containing nuts in store at Belen, Valencia County. (N.M. Coop. Rpt.).

MISCELLANEOUS INSECTS

AN ANT (Myrmecina americana) - CALIFORNIA - Light population collected from litter beneath scrub oak and Digger pine near the Salmon Falls bridge, El Dorado County. Collected and determined by Dr. M. Wasbauer, confirmed by R. Snelling. This is first record for State. (Cal. Coop. Rpt.).

ALLEGHENY MOUND ANT (Formica exsectoides) - ALABAMA - Probably this species, found in woodland in Randolph County. Det. by P. M. Marsh. (Moore, Ledbetter).

IMPORTED FIRE ANT (Solenopsis saevissima richteri) - ALABAMA - First flights noted in Chambers County. (Barwood et al.).

CITRUS WHITEFLY (Dialeurodes citri) - CALIFORNIA - Found in 23-block area of Fresno County. Delimiting survey underway. (Cal. Coop. Rpt.).

MILLIPEDS - ALABAMA - Immature forms numerous in garden mulch throughout State. (Barwood et al.).

CORRECTIONS

CEIR 15(5):57 (DETECTION) and 62-GOLDEN OAK SCALE (Asterolecanium variolosum) - ILLINOIS - Peoria County should read Lake County.

LIGHT TRAP COLLECTIONS

LIGHT TRAP COLLECTIONS

	Temperature °F.	Precipitation inches	Type of trap *	Agrilus laticornis (black cutworm)	Carpocapsa pomonella (codling moth)	Choristoneura auxillaris (army cutworm)	Scythris agria (salt-marsh caterpillar)	Parotis diffusa (wheat head armyworm)	Ptilia subterranea (granulate cutworm)	Heliothis virescens (tobacco budworm)	H. zea (bollworm, earworm, tomato fruitworm)	Loxostege compositella (garden webworm)	Loxostege sticticalis (beet webworm)	Ostrinia nubilalis (European corn borer)	Paridroma saucia (variegated cutworm)	Prodenia ornithogalli (yellow-striped armyworm)	Protoparce quinquemaculata (tomato hornworm)	Protoparce sexta (tomato hornworm)	Pseudactinia unipuncta (beet armyworm)	Spodoptera exiguua (beet armyworm)	Spodoptera frugiperda (fall armyworm)	Trichoplusia ni (cabbage looper)	Crops **
FLORIDA Gainesville 2/9			BL	1					4										1				
GEORGIA Tifton 1/27-2/3	23-65	0.4	BL						0	0	0						0	0					
SOUTH CAROLINA Charleston 2/8-14	40-76	2.0	BL	5		0		18		0	0				0	3	0	0	3		0	0	
TEXAS Brownsville 2/2-12	44-86	1.3	5 BL	55		13		465	6	204		34			30	27		1	44		130	138	

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* BL = blacklight; I = incandescent; MV = mercury vapor; 0 = other

** alf. = alfalfa; beet = garden beet and/or sugar beet; cole = cole crops (crucifers); cott. = cotton; FC = field corn; green = green beans; leg. = legumes (unspecified); lett. = lettuce; pean. = peanut; pepp. = pepper; pot. = potatoes; SC = sweet corn; sol. = solanaceous plants (unspecified); soy. = soybean; TC = truck crops (unspecified or mixed); tob. = tobacco; tom. = tomato.

ESTIMATED LOSSES AND PRODUCTION COSTS ATTRIBUTED TO INSECTS AND RELATED ARTHROPODS

IN _____
(State or District)DURING 1964
(Year)

- 110 -

ATTACKING _____
(Commodity or Crop)ATTACKING _____
(Commodity or Crop)

A. Pest or pest complex: English grain aphid, greenbug, grasshoppers

A. Pest or pest complex: English grain aphid, greenbug, brown wheat mite,
grasshoppers

B. Number of acres a produced (From CRS) No. 109,000

C. Average yield per acre a (From CRS) Units/ 37 bu.

D. Price^b per unit (bu.)^c (From CRS) \$/ .94

E. Acres a needing control No. 1,940

F. Acres a treated No. 375

G. Reduction due to not treating where needed:

H. Loss in yield, percent % 0.68

I. Loss in yield, units per acre a, C x H Units/ .2516 bu.

J. Loss in yield, \$ per acre a, D x I \$/ .24

K. Loss in quality, \$ per acre a \$/ ----

L. Yield loss for all acres a, (E-F) x I Units 393.75 bu.

M. Control cost, \$ per acre a, \$/ 1.25

N. Control cost for all acres a, F x M \$ 468.75

O. Yield loss for all acres a, (E-F) x J \$ 375.60

P. Quality loss for all acres a, (E-F) x K \$ ----

Q. Combined control cost and losses, N + O + P \$ 844.35

R. Percent loss due to each insect in the complex:

Comment: _____

- a. Acres, head of cattle or other producing units used by Crop Reporting Service.
- b. Season average price per unit as given by CRS (describe basis).
- c. Bushels, boxes, tons or other marketing units used by CRS; show which in ().

Submitted by William D. Marks
Date December 30, 1964Submitted by William D. Marks
Date December 30, 1964

- a. Acres, head of cattle or other producing units used by Crop Reporting Service.
- b. Season average price per unit as given by CRS (describe basis).
- c. Bushels, boxes, tons or other marketing units used by CRS; show which in ().

Comment: _____

ESTIMATED LOSSES AND PRODUCTION COSTS ATTRIBUTED TO INSECTS AND RELATED ARTHROPODS

IN Wyoming
(State or District)DURING 1964
(Year)ATTACKING Wheat
(Commodity or Crop)A. Pest or pest complex: English grain aphid, greenbug, brown wheat mite,grasshoppers

B. Number of acres	a produced (From CRS)	No.	224,000
C. Average yield per acre	a (From CRS)	Units/	24 bu.
D. Price ^b per unit (bu.)	c (From CRS)	\$/	1.25
E. Acres	a needing control	No.	5,700
F. Acres	a treated	No.	1,625

G. Reduction due to not treating where needed:

H. Loss in yield, percent	%	1.17
I. Loss in yield, units per acre	a, C x H	.2808 bu.
J. Loss in yield, \$ per acre	a, D x I	.35
K. Loss in quality, \$ per acre	a	----
L. Yield loss for all acres	a, (E-F) x I	Units 1,144 bu.
M. Control cost, \$ per acre	a	\$/ 1.25
N. Control cost for all acres	a, F x M	\$ 2,031.25
O. Yield loss for all acres	a, (E-F) x J	\$ 1,426.25
P. Quality loss for all acres	a, (E-F) x K	\$ ----
Q. Combined control cost and losses, N + O + P		\$ 3,457.50
R. Percent loss due to each insect in the complex:		

Comment:

a. Acres, head of cattle or other producing units used by Crop Reporting Service.

b. Season average price per unit as given by CRS (describe basis).

c. Bushels, boxes, tons or other marketing units used by CRS; show which in ().

Submitted by William D. MarksDate December 30, 1964ATTACKING Sugar beets
(Commodity or Crop)A. Pest or pest complex: Beet leafhopper, beet webworm, sugar-beet root maggot

B. Number of acres	a produced (From CRS)	No.	63,300
C. Average yield per acre	a (From CRS)	Units/	13.6 tons
D. Price ^b per unit (ton)	c (From CRS)	\$/	13.00 (estimate)
E. Acres	a needing control	No.	22,275
F. Acres	a treated	No.	20,150

G. Reduction due to not treating where needed:

H. Loss in yield, percent	%	3.21
I. Loss in yield, units per acre	a, C x H	Units/ .4366 ton
J. Loss in yield, \$ per acre	a, D x I	\$/ 5.66
K. Loss in quality, \$ per acre	a	\$/ ----
L. Yield loss for all acres	a, (E-F) x I	Units 927,775 tons
M. Control cost, \$ per acre	a	\$/ 4.50
N. Control cost for all acres	a, F x M	\$ 90,675.00
O. Yield loss for all acres	a, (E-F) x J	\$ 12,027.50
P. Quality loss for all acres	a, (E-F) x K	\$ ----
Q. Combined control cost and losses, N + O + P		\$ 102,702.50
R. Percent loss due to each insect in the complex:		

Beet leafhopper - 30, beet webworm - 25, sugar-beet root maggot - 10, others - 35

Comment: Approximately 3,600 acres of wasteland adjacent to beet-growing areas in Washakie County were treated for beet leafhopper.

a. Acres, head of cattle or other producing units used by Crop Reporting Service.

b. Season average price per unit as given by CRS (describe basis).

c. Bushels, boxes, tons or other marketing units used by CRS; show which in ().

Submitted by William D. MarksDate December 30, 1964

ESTIMATED LOSSES AND PRODUCTION COSTS ATTRIBUTED TO INSECTS AND RELATED ARTHROPODS

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IN Wyoming DURING 1964
(State or District) (Year)ATTACKING Beans
(Commodity or Crop)A. Pest or pest complex: Mexican bean beetle, flea beetles, lygus bugs

B. Number of acres ^a produced (From CRS) No. 50,000

C. Average yield per acre ^a (From CRS) Units/ 13.7 cwt.

D. Price^b per unit (cwt.)^c (From CRS) \$/ 6.60

E. Acres ^a needing control No. 1,160

F. Acres ^a treated No. 310

G. Reduction due to not treating where needed:

H. Loss in yield, percent % 2.66

I. Loss in yield, units per acre ^a, C x H Units/ .3644 cwt.

J. Loss in yield, \$ per acre ^a, D x I \$/ 2.41

K. Loss in quality, \$ per ^a \$/ ----

L. Yield loss for all acres ^a, (E-F) x I Units 309.74 cwt.

M. Control cost, \$ per acre ^a, \$/ 3.50

N. Control cost for all acres ^a, F x M \$ 1,085.00

O. Yield loss for all acres ^a, (E-F) x J \$ 2,048.50

P. Quality loss for all ^a, (E-F) x K \$ ----

Q. Combined control cost and losses, N + O + P \$ 3,133.50

R. Percent loss due to each insect in the complex:

Comment: _____

- a. Acres, head of cattle or other producing units used by Crop Reporting Service.
- b. Season average price per unit as given by CRS (describe basis).
- c. Bushels, boxes, tons or other marketing units used by CRS; show which in ().

Submitted by William D. Marks
Date December 28, 1964ATTACKING Potatoes
(Commodity or Crop)A. Pest or pest complex: Potato psyllid, Colorado potato beetle, striped flea beetle, tuber flea beetle

B. Number of acres ^a produced (From CRS) No. 3,400

C. Average yield per acre ^a (From CRS) Units/ 150 cwt.

D. Price^b per unit (cwt.)^c (From CRS) \$/ 3.05

E. Acres ^a needing control No. 3,105

F. Acres ^a treated No. 2,941

G. Reduction due to not treating where needed:

H. Loss in yield, percent % 2.19

I. Loss in yield, units per acre ^a, C x H Units/ 3.29 cwt.

J. Loss in yield, \$ per acre ^a, D x I \$/ 10.03

K. Loss in quality, \$ per ^a \$/ ----

L. Yield loss for all acres ^a, (E-F) x I Units 539.56 cwt.

M. Control cost, \$ per acre ^a, \$/ 5.00

N. Control cost for all acres ^a, F x M \$ 14,705.00

O. Yield loss for all acres ^a, (E-F) x J \$ 1,644.92

P. Quality loss for all ^a, (E-F) x K \$ ----

Q. Combined control cost and losses, N + O + P \$ 16,349.92

R. Percent loss due to each insect in the complex: Potato psyllid - 65, flea beetles - 20, Colorado potato beetle - 5, others-10

Comment: _____

- a. Acres, head of cattle or other producing units used by Crop Reporting Service.
- b. Season average price per unit as given by CRS (describe basis).
- c. Bushels, boxes, tons or other marketing units used by CRS; show which in ().

Submitted by William D. Marks
Date December 30, 1964

SUMMARY OF INSECT CONDITIONS IN THE UNITED STATES - 1964

INTRODUCTION

The summary of insect conditions that begins in this issue and will be continued in several succeeding issues of the Cooperative Economic Insect Report was compiled in Survey and Detection Operations from annual summaries that were submitted by various State and Federal cooperators. A list of the individuals who assisted in assembling data will be included after the last section of this summary is published. Survey and Detection Operations is especially appreciative of all these individuals for their assistance in the preparation of the material for the 1964 summary.

WEATHER OF THE YEAR 1964^{1/}

The costliest weather factor of 1964 was deficient summer and autumn rainfall that resulted in periods of severe to extreme drought in northeastern areas from northern Virginia through southern New England, in parts of southern Illinois, southeastern Minnesota, and a Great Plains belt extending from southeastern Wyoming and the Nebraska Panhandle through western Texas. Some other weather highlights included heavy snowfall in the western mountains, flood-producing rains in the Ohio River Basin in March and the Pacific Northwest in December, record-breaking annual rainfall in the Southeast, and hurricanes in August, September and October.

In most of the Far West, temperatures averaged below normal for every month, except October and December. East of the Rockies the first two months were cold, then a warm spring was followed by a cool summer. Autumn was normal. December was cold in the midcontinent area and warm east of the Mississippi River.

January and February were cold in the East, ending the fourth consecutive cold winter there. January was the warmest in 20 years in the upper Mississippi Valley, while a few extreme southern stations reported near-record cold not only for January but also for February.

Precipitation was above normal during January and February in the Atlantic Coastal States and unusually heavy in the Southeast. Heavy amounts in the western mountains during January built an unusually heavy snowpack which ranged up to more than 200 inches in the northern Cascades. January and February were very dry in parts of the midcontinent area, and February was extremely dry in the Far West. Heavy snow with local blizzard conditions occurred in the Northeast on January 13 with up to 20 inches of snow in eastern Pennsylvania. Another snowstorm of note occurred in the Texas Panhandle the first week of February when up to 25-inch falls drifted 20 feet high, isolating several towns and ranches. Flurries were reported at Houston and Galveston during the third week.

The winter of 1963-1964 for the Country, excluding Alaska and Hawaii, was only slightly warmer than that of 1962-1963, but was much colder in the Far West, much warmer in the North Central Interior, and about as cold in the South where a few locations reported the coldest winter on record.

Spring was cold in the Far West, mild east of the Rockies. Precipitation was extremely scanty in Atlantic coastal areas from North Carolina to southern New England, and the Ohio Valley thus setting the stage for the summer and fall drought.

^{1/} Prepared by L. H. Seamon, Climatologist, Office of Climatology, U.S. Weather Bureau, Washington, D.C.

The first several days of March were unusually warm. Abnormally cold weather during the remainder of the month was climaxed by a record-breaking cold wave in the Southeast at the end of the month. Peaches suffered heavy damage in the Carolinas and lesser damage in Georgia, Tennessee, Arkansas, and Mississippi. This was the coldest March on record at a few locations in the Far West. March precipitation was extremely heavy in the Ohio River Basin. During the first 10 days, 6 to 8 inches of rainfall between Louisville, Kentucky, and Cairo, Illinois, and somewhat lesser amounts over the rest of the Ohio Basin caused severe flooding in the Ohio River and many of its tributaries. Damage was estimated at many millions of dollars. On March 16, strong, gusty winds in the San Fernando Valley, south coastal areas, and the San Bernardino Mountains of California, spread fires that caused millions of dollars damage in addition to comparable property damage from the wind. Tucson, Arizona, had a 5-inch snowfall on the 3d. On March 4 a tornado in Hardin and Wayne Counties, Tennessee, caused millions of dollars damage.

A cold spell in the Far West April 22 to 24 damaged some peaches and cherries in Oregon and fruit and grapes in California. April precipitation was rather widespread with record amounts in the middle Mississippi Valley and Southeast. Numerous severe local storms took a heavy toll of property. Two of the worst of these included a hailstorm which caused damage estimated at 10 million dollars in the vicinity of St. Louis, Missouri, on the 2d, and a tornado caused 7 deaths and several million dollars damage at Wichita Falls, Texas, on the 3d.

Another cold spell in the Far West during the first half of May caused some crop damage in California and the Pacific Northwest. Following the driest May on record in Maryland, Delaware, and locally in New Jersey, North Carolina, Pennsylvania, and West Virginia, drought was becoming serious by the end of the month. Many forest fires broke out in southern New England. Tornadoes in the midcontinent area May 4 to 10 were responsible for several deaths and hundreds of injuries.

In general, the summer was unusually hot only in the lower Great Plains, and was rather dry. The first week of June was unusually cool in the eastern half of the Country, and some locations in Kansas, Missouri, Louisiana, and the Northeast had their lowest temperatures ever recorded in June. About midmonth, during another cool spell in the Northeast, snow squalls in northern Maine were the latest there on record and were only the second such occurrence in June. Drought continued from Maryland to New York, but precipitation was above normal in the northern Rockies and a flood in western Montana was responsible for 30 deaths and millions of dollars damage.

July was warmer than usual, except in the Southeast and Pacific Northwest where cloudiness prevented daytime temperatures from reaching their normal heights. The temperature at Atlanta, Georgia, failed to reach 90° during July for the first time in 87 years. Precipitation was spotty but generally above normal in the Pacific Northwest. Charleston, South Carolina, in a wet spot in the Southeast, measured 23.75 inches for the wettest month there since 1738. In contrast, the month was rather dry in the Northeast where some sections were plagued with drought for the third consecutive summer. Albany, New York, had only 42 percent of normal precipitation for the period April through July, the driest such period there since 1826.

August, relative to normal, was a very cool month, except hot in Texas. Portland, Maine, had its coolest August; Providence, Rhode Island, its coolest since 1927; Missoula, Montana, since 1899; and Knoxville, Tennessee, since 1889. During a cool spell at midmonth, temperatures at some locations were the lowest ever for August. Heavy snow fell in the northern Rockies during the last week. Continued dry weather in the lower Ohio Valley and Northeast cut production of some crops, but rains in Texas improved the dry situation there.

Hurricane Cleo entered Florida in the vicinity of Miami on August 27 and caused heavy rains along her path to Virginia. Wind damage occurred mainly in a narrow strip along the Florida coast. Total storm damage was estimated at more than one hundred-fifteen million dollars, excluding cleanup cost.

The first tornado fatalities of record in Arizona occurred west of Tucson on August 27. Another tornado caused two million dollars damage in the vicinity of Port Washington, Wisconsin, on August 22.

Temperatures for autumn averaged about normal. Precipitation was below normal in the major portion of the country. September was abnormally cool. Heavy rains were mostly limited to the lower Great Plains, parts of the Far Southwest, and upper Mississippi Valley where dry soil conditions were considerably relieved. Tucson, Arizona, had its wettest September since 1867 and its coolest since 1889. Heat and low relative humidity created a high fire hazard in northern California and three major fires burned nearly 100,000 acres. Reno, Nevada, recorded 100 percent of possible sunshine, the first time for September. Albany, New York, reported that its driest September since 1826 continued the record-breaking drought in that area. Reading, Pennsylvania, had its sixth driest growing season on record.

Dora, the first hurricane to pass inland over northeastern Florida and the second to affect Florida this season moved inland in the vicinity of St. Augustine during the night of September 9-10 and brought heavy rains to an area extending from Florida and southeast Alabama to southeast Virginia. Winds reached 100 m.p.h. on the coast. Preliminary reports of property damage from winds and tides indicated losses near two hundred million dollars in Florida and several million in Georgia.

October was mostly fair and sunny, favorable for harvesting but increased soil moisture deficiencies except in the Southeast. The month was abnormally cool in the East, warm in the Far West.

Hurricane Hilda reached St. Mary Parish, Louisiana, on the afternoon of October 3. Winds of 100 m.p.h. extended some distance inland. Several tornadoes occurred in Louisiana during the hurricane's passage. A combination of wind and up to 10 inches of rain caused extensive crop and property damage in Louisiana.

Hurricane Isbell moved inland near Everglades, Florida, on the afternoon of October 14 and offshore about 20 miles north of Palm Beach, Florida, during the evening of the same day. Winds up to 90 m.p.h. were reported on both the east and west coasts. At least 11 tornadoes occurred in east Florida coast counties during the hurricane's passage. Vegetable crops suffered heavy damage but property losses were light.

November, relative to normal, was mild east of the Rockies and cold in the Far West. Precipitation was mostly normal or above with unusually heavy amounts in California and the lower Great Plains. Extremely cold weather the third week continued the remainder of the month between the Great Lakes and the Rockies where some stations reported their coldest November. Snowfall was unusually heavy for November in the western mountains. November precipitation helped replenish water supplies over much of the Nation and furnished complete relief in some sections. Some heavy local flooding occurred in Kansas and Oklahoma the second half of the month.

Precipitation was above normal during December nearly everywhere except portions of the central and lower midcontinent area, furnishing further drought relief in the Northeast and Midwest. But unusually heavy to record-breaking amounts in the Far West caused disastrous floods in western Oregon and northern California. Snowfall was unusually heavy in the Cascade-Sierra Nevada Mountains. The month was among the coldest west of the Great Lakes, but mostly near normal elsewhere.

CEREAL AND FORAGE INSECTS

GRASSHOPPERS

Highlights:

GRASSHOPPERS were generally not a problem during the 1964 season. Egg hatch was delayed 2-3 weeks in Washington due to cool weather, and expected high populations did not materialize in the northeast part of the State. Populations were generally very light on rangeland throughout Colorado, with no buildup expected in 1965. Losses from grasshoppers in the State were negligible during 1964. Grasshoppers were generally more abundant in Utah than in 1963, but infestations in northern Nevada were much below predicted levels for the season. Grasshoppers damaged rangeland, pasture grasses and other forage crops in Texas, with heavy infestations reported in northwest, central and gulf coast areas. Populations were heavy in several portions of Oklahoma. Grasshopper numbers remained low in Kansas during 1964, but there was some spotted damage to crop and rangelands in Nebraska. Grasshopper populations over North Dakota were generally noneconomic to light, but moderate numbers did appear in isolated areas of the State. Weather conditions in Minnesota were ideal for egg hatch and nymphal development for the second consecutive year. The outlook for 1965 is for increased problems in areas rated as threatening to severe. Grasshoppers caused considerable damage to alfalfa and marginal rows of corn in scattered areas of Wisconsin, but high populations were less intensified with damage occurring over a wider area than in 1963. In Illinois, heavy rains aided in keeping populations at a low level. Populations were noneconomic throughout Indiana, and relatively low numbers were present in Michigan. A map showing the results of the adult survey for 1964 was carried in CEIR 15(3):following page 44.

GRASSHOPPER egg hatch was delayed two to three weeks in WASHINGTON due to cool weather. Numbers were generally low in the eastern portion of the State, with expected high populations not materializing in Ferry, Stevens and Pend Orielle Counties. Hatch was late in southern counties, with up to 50 percent in nymphal stages during the first week of August. Economic infestations developed only in Asotin and Garfield Counties, where grasshoppers averaged 10-12 per square yard on rangeland. The principal species causing damage in Washington during mild, fall weather in October were MIGRATORY GRASSHOPPER (*Melanoplus sanguineus*), PACKARD GRASSHOPPER (*M. packardii*), TWO-STRIPED GRASSHOPPER (*M. bivittatus*), *Arphia pseudonietana*, *Aulocara elliotti* and CLEAR-WINGED GRASSHOPPER (*Camnula pellucida*). Rangeland grasshopper activity was retarded during the early part of the 1964 season in WYOMING by a cool, late spring, with hatching underway by mid-May. Surveys revealed that more than 200,000 acres of rangeland were economically infested by June 25, and a cooperative rangeland control program was begun in the Platte-Goshen County area of the State by June 30. Controls were applied to a total of 223,983 acres of rangeland; 161,768 acres in Johnson County, 36,655 acres in Platte County, 24,060 acres in Goshen County and 1,500 acres in Hot Springs County. The 1964 adult survey in Wyoming indicated an 18-percent increase in infested acreage over that of 1963. A total of 1,156,000 acres of rangeland was found to be infested with grasshoppers numbering over 7 per square yard. In general, grasshopper populations were very light on rangeland throughout COLORADO in 1964, with no buildup expected in 1965. The only known control in the State was in Archuleta County by a landowner on a mountain meadow infestation of 200 acres. Losses caused by grasshoppers in Colorado during 1964 were negligible.

Grasshoppers in general, including migratory grasshopper and *Aulocara elliotti*, were more abundant in UTAH during 1964; however Packard grasshopper, two-striped grasshopper and RED-LEGGED GRASSHOPPER (*Melanoplus femurrubrum*) were present in normal numbers. Grasshoppers as a group were responsible for moderate damage in several areas of Washington County, Utah, during the 1964 season. Grasshopper infestations in the northern counties of NEVADA were much below predicted levels

for 1964. Although adult grasshopper surveys in 1963 indicated potential infestations on 334,240 acres for the 1964 season, unfavorable weather and other factors reduced populations in most areas in this section of Nevada, and only small, localized infestations developed. Most controls, where necessary, were applied against Aulocara ellioti, clear-winged grasshopper, migratory grasshopper, Packard grasshopper and Oedaleonotus enigma, except in Lyon County where Melanoplus cinereus was involved. The 1964 adult grasshopper survey in Nevada indicated infestations on 172,400 acres located primarily in Elko, Eureka, Humboldt, Lander and White Pine Counties. Early predictions concerning grasshoppers were difficult in CALIFORNIA during 1964 because of an open winter and because considerable periods of rain prevailed until May. In April, medium to heavy populations developed in Kern County and heavy hatches occurred at lower elevations in San Diego County. Infestations were prevalent in local areas of California from May through August, ranging light to heavy statewide. Pastures, rangeland and alfalfa were main areas of infestation, although walnuts and grapes were infested in Amador County, citrus in Madera County, and yards and gardens in Lassen and Shasta Counties. Most controls in California were applied by individual landowners; however, 4 widely scattered areas comprising 3,500 acres were treated with Federal assistance and 50,000 acres by local enterprise and county assistance in Kern County. Very light populations were beginning to appear at the end of 1964 in many areas of California where grasshoppers have been absent for the past several years. Several grasshopper species were of consequence on cereal and forage crops during the 1964 season, but very few areas required mass treatments.

In ARIZONA, spring hatching rangeland grasshoppers infested 15,500 acres of Federal and private lands in Graham, Apache, Navajo, Gila and Coconino Counties, and summer hatching species infested a total of 1,452,400 acres of Federal, State and private lands in Pima, Graham, Santa Cruz, Yavapai, Cochise and Pinal Counties. Due to drought conditions in most areas of NEW MEXICO during 1964, grasshopper hatch was erratic. Heavy infestations were found on approximately 500 acres near Regina in Rio Arriba County and approximately 4,000 acres of cropland and 500 acres of rangeland on the Zuni Indian Reservation south of Gallup, McKinley County. Spotted, light to heavy infestations of grasshoppers were also noted along the Rio Grande in Bernalillo and Sandoval Counties, New Mexico. In TEXAS, several species of grasshoppers damaged rangeland, pasture grasses and other forage crops, and heavy infestations were reported in northwest, central and gulf coast areas of the State during the 1964 season. Grasshopper nymphs became active in OKLAHOMA in mid-April and adults reached peak activity in July. Populations were heavy in several areas in the south central, west central and east central portions of Oklahoma, with controls carried out on 10,000 acres in Pittsburg County in early July. The dominant species in Oklahoma during 1964 were two-striped grasshopper, DIFFERENTIAL GRASSHOPPER (Melanoplus differentialis), Ageneotettix deorum and Mermiria maculipennis. Various grasshoppers were noted in ARKANSAS during the season. Infestations were average, except for a few which became economic in small areas of the northwest section. This was apparently the result of extended drought in this area. Treatments were applied to only 350 acres in the State this season. The principal grasshopper pest in Arkansas in 1964 was an unspecified long-nosed species.

Nymphs of migratory grasshopper began emerging in the southeastern delta area of MISSOURI about May 2 and nymphs of Melanoplus spp. were emerging in southwestern, central and northwestern areas of the State by May 16. Grasshopper hatch was 90 percent complete by May 30. Adult populations were low in all areas of Missouri in 1964, and economic damage was rare. Excessive rain at hatching time and during early nymphal stages was undoubtedly responsible for the reduction of the number of grasshoppers reaching full growth. Highest grasshopper infestations in Missouri during the season were classed as moderately light; counts ranged 3-7 per square yard in the field and 11-20 per square yard in margins in Monroe, Audrain and Boone Counties (central area), Barton, Dade, Jasper, Lawrence, Newton and Barry Counties (southwest area) and in Douglas, Howell and Ozark Counties (south central area). The most economic species in the State during the season, in order of importance, were red-legged grasshopper, differential grasshopper, migratory grasshopper and two-striped grasshopper. No formal survey was conducted

in Missouri during 1964. Grasshoppers remained low in numbers in KANSAS, with controls being applied only in a few local areas. Grasshoppers caused spotted damage to crop and rangelands in NEBRASKA during the 1964 season. Infestations ranged from moderate to severe on cropland and rangeland, but cropland infestations were scattered. Damaging populations occurred in the southwest and southeast areas and along the southern border of the State. Infested rangeland areas were largely in the pine ridge area of northwest Nebraska. Cropland controls were applied at the local level and there was a small rangeland control program in northwest Nebraska.

Grasshopper eggs in SOUTH DAKOTA were 10 percent coagulated, 30 percent eye spot and 60 percent segmented during the first part of May. Predators and parasites destroyed 10 percent of the eggs present. Light grasshopper hatches were observed in the south central and west central regions of South Dakota during mid-May and economic numbers on croplands did not appear in the State until about mid-July, when damage was observed on corn and alfalfa. An intensive spray program was undertaken on rangeland in Shannon County on July 1 where grasshoppers were very abundant. Control was very effective in the area. The adult grasshopper survey was begun August 10 and revealed many scattered high infestations throughout the State. Damage to winter grains was observed in central South Dakota during the late fall. The grasshopper egg survey was conducted only in fields where heavy adult populations had occurred during the summer, and the results showed a light to threatening situation, with control being difficult due to the dry conditions that existed. Grasshopper populations over NORTH DAKOTA were generally noneconomic to light; however, moderate numbers appeared in isolated areas. Results of the fall egg survey were similar to the adult survey. Migratory grasshopper and Ageneotettix deorum were the dominant rangeland species, with migratory grasshopper, red-legged grasshopper, two-striped grasshopper, differential grasshopper and Packard grasshopper being the principal cropland species. Chorthippus longicornis was one of the dominant species in some eastern areas of the State. Cropland infestations were mostly noneconomic to light, with the occasional appearance of moderate numbers. Immature stages of bee flies, ground beetles and blister beetles were found at most sites where eggs were observed in South Dakota, but less than one percent of egg pods were destroyed or infested in 1964.

For the second consecutive year, weather conditions in MINNESOTA during 1964, were ideal for grasshopper egg hatch and nymphal development. Drought conditions beginning in May and extending through July resulted in population increases in nearly all districts of the State. Grasshoppers showed greatest increases in population and area of infestation in the southeastern corner of the State. In general, other areas of the State remained much the same as in 1963, but population intensity did increase. Grasshopper populations along roadsides, ditches and, to a lesser extent, field margins showed marked increases in 1964. Threatening to severe infestations were most numerous in southeastern, east central, central and southwestern Minnesota and, to a lesser extent, in west central and northwestern districts. Within these threatening to severe areas, infestations were scattered and localized during the 1964 season. Alfalfa was the primary host, but where roadside and ditchbank infestations occurred adjacent to crops, corn and soybeans were important hosts. Grasshopper movement from hatching areas into corn and soybeans occurred throughout Minnesota, and the drought conditions of 1964 intensified this movement. Two migrating flights were reported in the State, one in Hennepin County and the other in Wright County. Damage to corn, soybeans and hay crops, coupled with drought conditions, was heavy in some areas of the State. Control work, however, was limited. Red-legged grasshopper continued to be the dominant species in Minnesota during 1964. Differential grasshopper and two-striped grasshopper were present in low numbers generally, but were economic in some fields, especially along roadsides. The outlook for the 1965 season in Minnesota is for increased grasshopper problems in areas of the State rated as threatening to severe. Weather conditions at and after egg hatch in 1965 will be the single, most important factor in determining the extent and severity of grasshopper infestations in Minnesota.

In WISCONSIN, considerable damage to alfalfa and marginal rows of corn occurred in scattered areas. High populations of grasshoppers were less intensified, and damage occurred over a wider area than in 1963. Eggs of red-legged grasshopper were in the coagulated stage by May 8, with second to fourth instars observed by June 5. A delayed hatch occurred in Wisconsin in late June and early July, with first adults present by July 24 and egg development being noted by August 14. Eggs were ready for deposition by August 28, and mating and oviposition were observed as late as October 16. In Richland County, Wisconsin, adults were common on November 13. Damage was most noticeable in extreme northwest, west central, central, east central and south central areas of the State this season. Development of two-striped grasshopper had reached third and fourth instars by June 26 with feeding on corn and soybeans observed in Adams County, and oviposition noted in Oneida County by August 7. Eggs of Melanoplus confusus hatched April 25, about 5 days later than previous years. Eggs of differential grasshopper were in the coagulated stage by May 8, second instars were observed by May 15 and some fourth-stage nymphs by June 5, and adults were noted by August 7. Adults of CAROLINA GRASSHOPPER (Dissosteira carolina) were common along roadsides in Wisconsin in mid and late summer.

Red-legged grasshopper, migratory grasshopper and differential grasshopper were less abundant in ILLINOIS during the 1964 season than they were in 1963. The main grasshopper hatch occurred about mid-June and heavy rains aided in keeping populations low this season. The first adults of migratory grasshopper were observed in sandy areas July 6-9. Grasshoppers, in combination with other insects, caused some rather noticeable leaf feeding injury in fields of soybeans and marginal rows of corn in Illinois during the season. Controls for grasshoppers were applied to an estimated 219,626 acres of cropland in the State during 1964, which is about one-third the acreage treated during the 1963 season. Grasshopper populations were generally noneconomic throughout INDIANA during 1964. In the northern quarter of the State, scattered populations reached maximum densities of 5-7 adults per square yard in field margins of alfalfa. Elsewhere in Indiana, population densities were less than one adult per square yard. Red-legged grasshopper tended to dominate the grasshopper population in Indiana during 1964, but other species commonly observed included differential grasshopper, two-striped grasshopper, Carolina grasshopper and an occasional Schistocerca sp.

Grasshoppers were present in relatively low numbers in MICHIGAN during the 1964 season. A survey conducted September 29 revealed low numbers of red-legged grasshopper in Montcalm, Mecosta, Osceola, Missaukee and Kalkaska Counties. Adults of red-legged grasshopper, which was the most common species found, numbered fewer than 2 per square yard in the most heavily infested field surveyed, a mixture of red clover and alfalfa in Mecosta County. Migratory grasshopper was the second most common species found in these aforementioned counties of Michigan. No fields were surveyed where adults of migratory grasshopper numbered higher than one per square yard. During the 1964 annual grasshopper survey in OHIO, lower populations, more species and a wider State distribution were observed. The total grasshopper population was estimated to be composed of 70 percent red-legged grasshopper, 24 percent differential grasshopper, 3 percent Tettigidea spp. and Arphia xanthoptera, and the remaining one percent consisted of Encoptolophus sordidus, Hippiscus rugosus and unidentified miscellaneous grasshoppers.

Adults and nymphs of differential grasshopper and red-legged grasshopper caused conspicuous late-season damage to foliage and silks of field corn in Frederick, Carroll and Montgomery Counties, MARYLAND. During July and August, Melanoplus spp. were general in alfalfa and red clover and caused noticeable injury to these crops in several areas of the State. In early September, several fields of soybeans on the lower Eastern Shore of Maryland were extensively damaged by Melanoplus spp. The hatch of first-generation grasshoppers occurred throughout ALABAMA about March 25 to April 15, coinciding with the emergence of cotton, corn, grass, legumes and other crops. Some ragging of young plants followed, but no serious loss of stands or early crop destruction occurred this season. Continuous and overlapping generations followed. Considerable feeding on foliage

of lespedeza, kudzu, grain sorghum, Bermuda grass, Johnson grass, hybrid Sudan grasses and other forage crops was observed. The most serious damage caused by grasshoppers in Alabama during the 1964 season and in combination with unspecified crickets, was perhaps the destruction of or weakening of stands of reseeded crimson clover, sweet clover and other winter clovers in grass sods during September, October and November. Extremely large grasshopper populations built up from September until frost in late November and seedlings of winter clovers were destroyed almost before true leaves appeared and before the situation could be recognized. The species involved, in order of importance, were red-legged grasshopper, differential grasshopper, AMERICAN GRASSHOPPER (Schistocerca americana) and other miscellaneous species.

MORMON CRICKET (Anabrus simplex) was no threat to the large acreages of rangelands in the Bear Mountain area of Daggett County, UTAH, during the 1964 season. Light infestations were found in Daggett, Uintah, Millard, Sanpete, Tooele, San Juan, Grand and Juab Counties, with numbers generally too light to justify major control programs. A small infestation of Mormon cricket was found May 6, 1964, near Page in Coconino County, ARIZONA. This is the first time this cricket has been detected in this area. Adult surveys for Mormon cricket in NEVADA indicated a decrease from the 33,000 acres infested in 1963 to 8,500 acres infested during 1964. The heaviest infestations found this season were on 6,500 acres in Eureka County and 1,200 acres in Lander County. In IDAHO, scattered infestations of Mormon cricket were noted on Packer John Peak in Valley County east of Cascade during September. A possible buildup was indicated at that time, but apparently did not materialize. Emergence of Mormon cricket was well advanced in northern Sherman and Gilliam Counties, OREGON, during the week ending April 18. Crickets were locally abundant in protected canyons, with counts up to 10 per square yard being found April 6 and 7. Scattered individuals of Mormon cricket in the solitary stage were observed in Grant and Okanogan Counties, WASHINGTON, throughout the summer of 1964.

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